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ALPINE FLORA OF SAN FRANCISCO MOUNTAIN, ARIZONA

Elbert L. Little, Jr.[1]

San Francisco Mountain, known locally as the San Francisco Peaks, is the highest point in Arizona and has the state's only definitely alpine area. The disjunct alpine flora of this isolated volcanic cone is, therefore, of special interest. Forty-nine species of alpine vascular plants, including four not recorded previously for the state and several others found nowhere else in Arizona, are represented in a spare-time collection made here by the author in 1938.

Although many botanists have visited San Francisco Mountain during the past half century, there has been no previous attempt to assemble a complete collection of the alpine flora or to prepare a description of the vegetation above the timberline. The author was stationed nearby at Fort Valley Experimental Forest, a branch of the Southwestern Forest and Range Experiment Station about nine miles northwest of Flagstaff. From this convenient base he made nine collecting trips to summits of the highest peaks during the growing season from June to September 1938, besides one trip in 1937 and two in 1939.

Geology and Geography

This eroded volcano (text fig. 1) is situated about ten miles north of Flagstaff, Coconino County, northern Arizona (mostly in T. 22 and 23 N., R. 7 E., Gila and Salt River Meridian, centering near latitude 35° 20′ N., longitude 111° 40′ W.). From a high timbered plateau within Coconino National Forest about 7000 feet above sea level, it rises abruptly more than a mile to a maximum elevation of 12,655 feet and forms a prominent landmark visible many miles from all directions.

A summary of the geology and geography of San Francisco Mountain, taken mainly from Robinson's (18) monograph, will serve as a background for the discussion of the alpine plants. The area was at no great height above the sea when volcanic activity in the form of lava flows began in the Pliocene epoch. In early Pleistocene, San Francisco Mountain with four smaller volcanoes was formed from about 38 cubic miles of lava and rose about 8800 feet above the plain. Afterwards the region was raised to its present height above sea level, and nearly four hundred small basaltic cinder cones were formed.

Since the volcano became extinct San Francisco Mountain has lost by erosion about three thousand feet or more than one-third

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of its height but only about eight per cent of its volume. No trace of the former crater is left. A large interior valley, called the Inner Basin, was formed on the northeast side and was occupied by a glacier nearly two miles long probably in the late Wisconsin stage. This station was thought to be the southernmost for Pleistocene glaciation in the United States until evidence of glaciation was found a few years ago in the White Mountains of southern New Mexico; Pleistocene glaciation occurred also farther south than San Francisco Mountain on San Gorgonio Peak, southern California. As a result of erosion San Francisco Mountain (text fig. 1; pl. 5, fig. 1) now has the shape of a hollow, truncated cone about twelve miles or less in diameter at the base, two miles in diameter at the top, and one mile high. Its slope is about 20 degrees at the top and gradually becomes less towards the base. The irregular rim forms a knife-edge divide between the outer slope and the Inner Basin. Along this crest line, which is continuous except on the northeast, are six peaks above 11,000 feet in elevation. The three highest, projecting above the timber line, are: Humphreys Peak, elevation 12,655 feet, on the northwest; Agassiz Peak, elevation 12,384 feet, on the southwest; and Fremont Peak, elevation 11,984 feet, on the south.

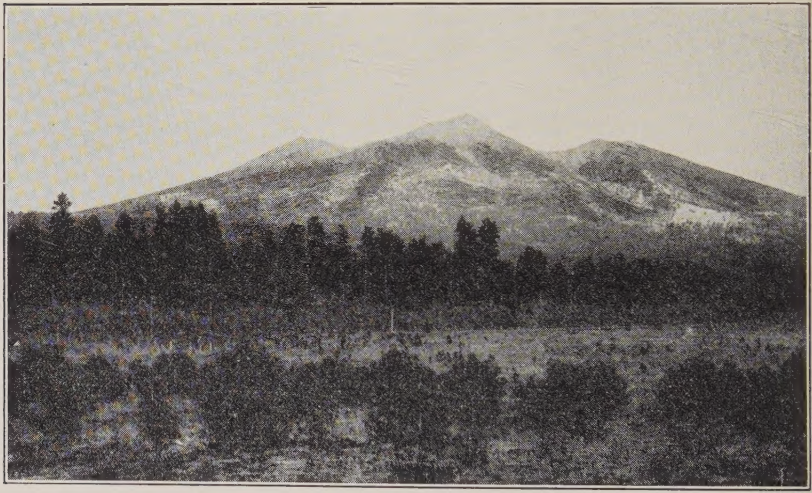

Fig. 1. San Francisco Mountain, as viewed from Fort Valley Experimental Forest on the southwest, is a symmetrical, eroded volcanic cone. Its three highest peaks are Humphreys Peak (left), Agassiz Peak (center) and Fremont Peak (right).

Previous Botanical Investigations

No references to alpine plants of San Francisco Mountain were found in reports of the United States Government exploring and surveying expeditions, though this mountain lay on the route of several. In the United States National Herbarium are specimens of alpine plants collected on San Francisco Mountain by the following early collectors in the years indicated: E. Palmer, 1869; H. H. Rusby, 1883; M. E. Jones, 1884; Mr. and Mrs. J. G. Lemmon, 1884; E. L. Greene, 1889; F. H. Knowlton, 1889; D. T. MacDougal, 1891, 1898; J. W. Toumey, 1892; E. O. Wooton, 1892; C. A. Purpus, 1900; J. B. Leiberg, 1901; G. A. Pearson, 1908–1909. The Forest Service herbarium at Fort Valley Experimental Forest has specimens of about 25 alpine species collected by G. A. Pearson and others.

Hoffman (9) in 1877 noted that the timberline was irregular, approaching to within one thousand feet of the summit on the eastern side and five hundred feet on the western. Rusby (19) wrote in 1889 that at the summit grow only lichens and that the alpine flora, of which he named 6 species, begins one or two hundred feet below. This statement, perhaps the source of a similar one by Harshberger (8, p. 583), is not strictly correct. In a list of Arizona plants collected by E. A. Mearns, Britton (2) in 1889 mentioned 23 species from San Francisco Mountain, including about 6 occurring above timberline. The first meteorological studies in the alpine zone of San Francisco Mountain were made by D. T. MacDougal in August 1898, (3, p. 43–45).

There have been four detailed studies of the vegetation of San Francisco Mountain and vicinity from different viewpoints. First of these and the only one to include the alpine zone was Merriam's (13) biological survey in 1889. A timber survey of the forests of this area was made by Leiberg, Rixon, and Dodwell (11) in 1901 and 1902. Pearson's (16) detailed study of the forest types of San Francisco Mountain included measurement of environmental factors from 1917 to 1919 at five climatic stations in different zones from the base to the timberline. Hanson (7) in 1922 and 1923 conducted a similar series of climatic stations in his research on the vegetation of the four lower zones at the base of this mountain. The more recent summaries of Arizona vegetation by Nichol (15) and others contributed no additional information on alpine plants.

San Francisco Mountain is of special historical interest to biologists because it was here in 1889 that Merriam (13) made one of the first thorough investigations of the plant and animal life of a western locality and worked out his life zones or climatic zones. From the alpine zone, above 11,500 feet, on the "bleak and storm-beaten summit" of San Francisco Mountain, Merriam listed 20 species of vascular plants. He recognized also the subalpine or timberline zone, a narrow belt at an elevation of 10,500 to 11,500 feet, where the trees became stunted and prostrate, and included a list of 16 species attaining their maximum development here. Later, when he proposed his explanation of temperature control of the geographic distribution of animals and plants, Merriam (14) omitted the subalpine zone, which does not appear to be distinct ecologically, and did not separate it from the Hudsonian or spruce zone.

Merriam's two lists totaling 34 species comprise the only detailed published study of alpine and timberline plants of San Francisco Mountain. This collection, which was made by F. H. Knowlton and deposited in the United States National Herbarium, contains specimens of a few other alpine species not mentioned by Merriam. *Corallorhiza maculata* (listed as *C. multiflora*) was recorded from timberline zone apparently through error, as the altitude mentioned on the label (*Knowlton 106*) is 10,000 feet. The author has collected specimens of all the others in Merriam's two lists except *Sagina saginoides* (*S. Linnaei*).

DISCUSSION

Alpine areas above timberline on San Francisco Mountain occupy about two square miles, nearly all located on the slopes of Humphreys and Agassiz peaks (pl. 5, fig. 1). As here limited the alpine zone is that above the highest wind timber, "krummholz," or dwarf tree species (pl. 5, fig. 2). On this mountain such alpine scrub is represented by Engelmann spruce (*Picea Engelmanni* Parry) and bristlecone pine (*Pinus aristata* Engelm.). Though roads go about half-way up the mountain on four sides, the rocky alpine summits must be reached on foot.

Timberline is somewhat irregular and extends nearly one thousand feet higher up the southern and western exposures than the northern and eastern. In ravines on north-facing slopes finger-like areas of alpine vegetation reach down to lower levels. Typical alpine vegetation may occur in protected areas while trees grow on exposed ridges above. Besides the obvious effects of direction of slope and topography, drifting of winter snows is partly responsible for the irregularity of the timberline. After winter storms white clouds of snow are blown off Humphreys Peak into the Inner Basin. The best development of alpine meadows is at an elevation slightly below 11,500 feet at the extreme upper end of the Inner Basin where the deeper snow drifts do not disappear until midsummer. At one place here an alpine meadow merges laterally into a subalpine meadow.

ENVIRONMENTAL FACTORS. Climatic and edaphic factors affecting the alpine vegetation here probably are similar to those of other exposed western peaks. Coville and MacDougal (3) noted that air temperature at the summit of Agassiz Peak had less daily

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EXPLANATION OF THE FIGURES

PLATE 5. ALPINE ZONE OF SAN FRANCISCO MOUNTAIN, ARIZONA. Fig. 1. View from Fremont Peak northwest across the Inner Basin, showing treeless alpine summits of Agassiz Peak (left) and Humphreys Peak (right). Fig. 2. Wind-swept, dwarf Engelmann spruce (*Picea Engelmanni*) at timberline ridge on west side of Agassiz Peak. Alpine rock field or lichen association in background. Pearson's timberline climatic station was nearby. Fig. 3. Alpine meadow association, in which the dominant species, *Geum turbinatum*, forms mats of vegetation on a rocky slope.

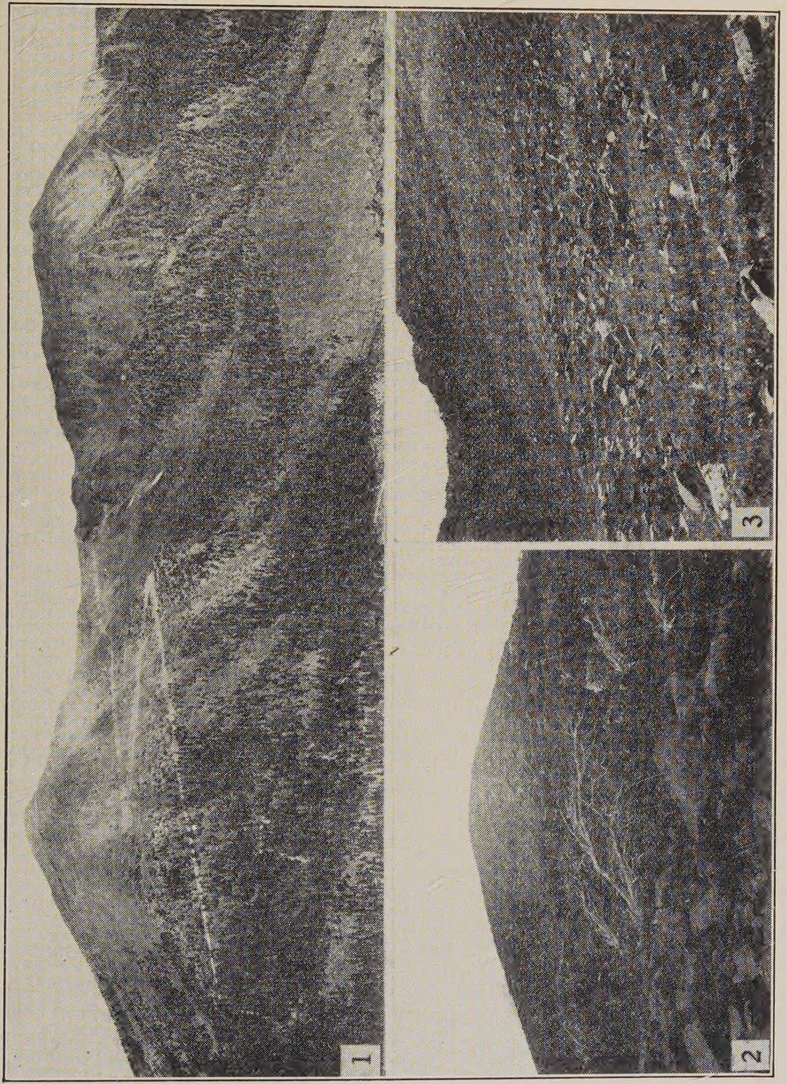

PLATE 5. ALPINE ZONE OF SAN FRANCISCO MOUNTAIN, ARIZONA

variation than that at lower altitudes but found a greater difference between temperature of soil and air at the top than at lower levels.

In the absence of other instrumental records in the alpine zone, it may be of interest to summarize comparable data from Pearson's (16) timberline station (pl. 5, fig. 2) from 1917 to 1919 to indicate the climatic conditions under which the alpine plants are growing. During these three years the frostless period here, from June to September, varied between 101 and 113 days. Mean air temperature for the period from June to September was 47.9 degrees. Because of temperature inversion, or cold air drainage, night temperatures at timberline were little if any colder than at lower altitudes, but the days were decidedly colder. Annual precipitation at Pearson's timberline station was slightly higher than at lower zones, totaling 28.03 inches in 1917, 37.74 inches in 1918, and 52.05 inches in 1919. The P/E ratio, or precipitation divided by evaporation, for the interval from June to September was .812. Wind movement on the exposed ridge at timberline was relatively high.

During the winter months from November or December to March or April San Francisco Mountain has a white cap of snow, which buries and protects the dormant alpine vegetation. In April and May the snow melts in most places above timberline, exposing the dark-colored rock. However, on shaded slopes and areas of deep drifts, large snow banks remain until early July. In 1938 the last small patch of snow melted in the latter part of August. Frequent thunderstorms of cold rain occur in the summer rainy season from July to September. The first light winter snow in the alpine area usually falls early in October.

Above timberline soils are poorly developed and the slopes are largely covered with angular blocks or boulders of andesite and pyroxene dacite. Wind, frost action, and erosion all retard the formation and accumulation of soils on the steep slopes and make the establishment of vegetation difficult. Soil pockets occur in crevices, and in places spreading mats of vegetation hold the shallow soils and help to form more.

PLANT ASSOCIATIONS. The alpine vegetation of San Francisco Mountain is poorly developed and the alpine flora impoverished, in comparison with alpine vegetation and flora of larger, higher mountains. Only two plant associations are distinguished here, the alpine rock field or lichen association and the alpine meadow or *Geum turbinatum* association. In the xerosere the former association gradually merges into and is succeeded by the latter, which is the climax. As no streams, lakes, or permanent snow drifts are present, there is no hydrosere.

In contrast, Cox (4) described on James Peak, elevation 13,260 feet, in Colorado, a much richer alpine vegetation. The alpine meadow, or *Geum turbinatum* association of San Francisco Mountain corresponds with the dry meadow associations on

James Peak, where *Carex rupestris* and *Geum turbinatum* are dominant. On James Peak, however, the dry meadow is succeeded by a climax alpine meadow association in which *Elyna Bellardi,* a species not found on San Francisco Mountain, is dominant. The various communities in hydroseres from wet stony areas, stream and lake margins, and snow drifts through scrub, moor, and wet meadow types to the climax alpine meadow of James Peak all are absent from San Francisco Mountain.

ALPINE ROCK FIELD. The alpine rock field or lichen association occupies most of the mountain summit of San Francisco Mountain, including exposed peaks and ridges (pl. 5, fig. 2). However, some unstable rock slides are almost without plants. This association is characterized by lichens, principally crustose and foliose, on the rock outcrops with vascular plants scattered among the boulders wherever there is sufficient soil. Even on the highest, exposed peaks a few seed plants can be found. Probably the most abundantly represented species or dominant species is the crustose lichen *Rhizocarpon geographicum* (L.) Lam. & DC. (determination verified by Dr. Carroll W. Dodge). Two species of foliose lichens, of which specimens were collected here previously for the Forest Service by F. W. Haasis and J. O. Veatch and determined by G. K. Merrill, are *Lecanora rubina* (Vill.) Ach. and *Parmelia conspersa* (Ehrh.) Ach. Mosses are less common than lichens and are found in crevices and to a lesser extent on boulders. *Hypnum revolutum* (Mitt.) Lindb. is characteristic of the shaded soil pockets. The moss species most commonly represented on dry outcrops is *Grimmia Doniana* Sm., which, according to Edwin B. Bartram who determined the two mosses, may be the first record for the state. The only alpine pteridophyte, *Cystopteris fragilis,* is commonly distributed in crevices.

The number of species of flowering plants represented in the alpine rock field is high and includes nearly all occurring above timberline. Of these the mat-forming pioneer species of the alpine meadow, *Geum turbinatum,* is most conspicuously represented. Five characteristic species of Caryophyllaceae here are *Arenaria Fendleri, A. sajanensis, A. verna, Cerastium Beeringianum,* and *Silene acaulis.* Three species of grasses commonly represented are *Festuca ovina* var. *brachyphylla, Poa rupicola,* and *Trisetum spicatum. Carex bella* is the sedge species most commonly represented, and *Luzula spicata* the typical rush. Other characteristic species in the rock field include *Polemonium confertum, Solidago ciliosa, Thlaspi Fendleri,* and *Pseudocymopterus montanus.* Typical pioneer species on rock slides are *Geum turbinatum, Primula Parryi, Senecio franciscanus,* and *Arenaria saxosa.* In shaded crevices and cliffs *Heuchera versicolor* f. *pumila* and *Oxyria digyna* are commonly represented.

ALPINE MEADOW. The alpine meadow or *Geum turbinatum* climax association is developed on the more favorable sites, such as at the upper end of the Inner Basin and ravines not far above timberline (pl. 5, fig. 3). However, the area occupied is only a small fraction of the alpine zone. Plants of the dominant species, *Geum turbinatum,* start as pioneers on rocky slopes and especially at the bases of rock slides. They spread vegetatively by creeping stems to form compact mats in which soil is built up and other plants become established to form an almost solid mantle of vegetation. If any species of vascular plants may be said to be abundantly represented above timberline, it is this. Other mat-forming species here include *Potentilla Sibbaldi* and *Silene acaulis.*

Most of the species listed under rock fields are commonly represented also in meadows. The following species of grasses and sedges are typical: *Festuca ovina* var. *brachyphylla, Trisetum spicatum, Carex bella, C. albo-nigra,* and *C. ebenea.* Other species of meadows include *Luzula spicata, Arenaria sajanensis, Cerastium Beeringianum,* and *Solidago ciliosa.* Scattered or rare in alpine meadows are individuals of the following species not observed elsewhere above timberline: *Phleum alpinum, Poa reflexa, Gentiana barbellata, G. monantha, Pedicularis Parryi, Veronica Wormskjoldii,* and *Erigeron simplex.*

Mosses of several species are present in alpine meadows but are not common. Liverworts of a single species, *Lophozia porphyroleuca* (Nees) Schiffn. (determination by Dr. A. W. Evans), were found above timberline. Not reported previously from Arizona, this species is represented sparingly in alpine meadows and more commonly in the subalpine forest.

This climax association is slowly spreading through mat formation by the dominant species, and all degrees of intermediate stages between rock field and meadow can be observed. The two associations sometimes are mixed together, for example near the bases of steep slopes where large boulders which have rolled down from above have a vegetation of lichens though surrounded by a climax meadow.

Above timberline growth begins in June, or possibly earlier on southern and western exposures. By the middle of June plants of the following species are in flower: *Thlaspi Fendleri, Geum turbinatum, Pseudocymopterus montanus,* and *Polemonium confertum.* Most of the alpine species blossom in July and August. Among the last species to begin flowering, in August and September, are *Gentiana barbellata, Erigeron simplex, Senecio franciscanus,* and *Solidago ciliosa.* Plants of *Geum turbinatum* continue to flower throughout the summer. By the first of October even the last late flowers have been killed by frosts and the vegetation has become dormant for the winter.

Geographic Distribution of Species. Four species of vascular plants found by the author on San Francisco Mountain apparently are here first recorded for the state with corresponding extensions of range. All have a northern distribution and reach their southern limits on this and similar mountain summits. The alpines are *Juncus Drummondii, Erigeron compositus,* and *Erigeron simplex.* More unusual is *Botrychium lanceolatum,* a subalpine pteridophyte reaching the timberline. This circumboreal species has been recorded previously from only three western states, Washington, Wyoming, and Colorado. As the author (12) has noted, the station on San Francisco Mountain is the southernmost reported in North America and nearly four hundred miles southwest of the nearest known localities in central Colorado. A few other alpine species here have been found nowhere else in Arizona, but some occur also on Arizona's second highest mountain, Thomas or "Baldy" Peak, elevation 11,470 feet, in the White Mountains one hundred and fifty miles southeast.

Merriam (13) observed that many of the species above timberline on San Francisco Mountain are arctic-alpine circumpolar species widely distributed in arctic regions of North America and Eurasia, such as Alaska, Hudson Bay, Greenland, Spitzbergen, and Siberia, and extend far south on summits of such high mountain ranges, as the Sierra Nevada, Rocky Mountains, Alps, and Himalayas. However, after an interval of fifty years, there are fewer species in common with these more distant points, owing to increased knowledge and probably also to a trend toward a narrower concept of the species. As a result of such changes and of corrections in nomenclature, only one-half of the 34 species listed by Merriam (13) as occurring in the alpine and timberline zones now bear the same names.

The occurrence of disjunct arctic-alpine plants on San Francisco Mountain was explained by Merriam according to the present interpretation, that of migration southward during the glacial period and the ascension of mountain peaks as the temperature became warmer. He concluded that, as these species could not have reached here afterwards, the volcano could not be of more recent origin than the glacial period.

Rydberg (20) classified the alpine flora of the Rocky Mountains into ten groups according to geographical distribution, while Holm (10) in a detailed analysis of the alpine flora of Colorado distinguished four elements as to origin. The 49 alpine species of San Francisco Mountain fall into five more or less natural groups, according to their ranges as given in floras and manuals and in the phytogeographical treatises by Rydberg (20) and Holm (10). These groups are listed below with the abbreviations used in the list of species, the number of species in each, and the percentage of species in each.

	Number of species	Per cent
Arctic-alpine circumpolar species (CP)	15	30.6
North American arctic-alpine species (NA)	5	10.2
Rocky Mountain alpine species (RM)	24	49.0
Southwestern species (SW)	3	6.1
Endemic species (EN)	2	4.1

Thus, the relationships of the alpine flora of San Francisco Mountain are quite definitely northern with the floras of arctic and alpine regions. The 15 arctic-alpine circumpolar species, almost one-third of the total, are widely distributed in arctic regions in North America and Eurasia and on alpine mountain summits at lower latitudes. Two of these, *Arenaria sajanensis* and *Stellaria umbellata,* are recorded from Siberia but not from Europe, while the rest are listed from both Europe and Asia. A few have even wider distribution. *Cystopteris fragilis* is almost cosmopolitan and ranges to tropical America. *Phleum alpinum* and *Trisetum spicatum* are found also in alpine South America.

The 5 North American arctic-alpine species have a distribution from Greenland to Alaska, or slightly narrower, and southward on high western mountains but are not listed from Eurasia. The 24 Rocky Mountain alpine species occur in high mountains generally from Montana south to Colorado and Utah and on the highest peaks of New Mexico and Arizona. Some of these are found also in somewhat lower zones. Three southwestern species are confined to New Mexico and Arizona or slightly beyond and apparently have migrated up to the alpine area from lower zones, where they are more typical.

Only two alpine species, *Senecio franciscanus* Greene (5, p. 19–20), and an undescribed species of *Pedicularis,* are endemic to San Francisco Mountain, and neither furnishes a clue as to routes of migration. In his monograph Greenman (6, p. 29–30) listed only 6 collections of *Senecio franciscanus,* all from this mountain. Though *Senecio* is well represented in alpine regions with several species confined to Colorado, the species apparently most closely related to *S. franciscanus* are distributed nearby at lower zones in the same area. The undescribed species of *Pedicularis* is an endemic closely related to the widely ranging species, *P. Parryi* A. Gray. Several other alpine plants here have been proposed as new species, but these have been reduced to synonymy, with the exception of one or two retained as varieties of other species. However, a large number of endemic species is not to be expected on a geologically young volcanic cone.

Most of the alpine species of San Francisco Mountain are found also below timberline, especially in subalpine meadows. The following commonly represented species, as well as a few others, are confined to the alpine zone here: *Arenaria sajanensis, Silene acaulis, Polemonium confertum,* and *Senecio franciscanus.* A few, such as *Arenaria Fendleri* and *Thlaspi Fendleri,* are equally characteristic of the western yellow pine zone at the base of the mountain.

By comparing the alpine flora of San Francisco Mountain with similar plant lists from other southwestern peaks, it should be possible to trace the probable routes of the arctic-alpine plants in migrating to this newly formed volcano. Bailey's (1, p. 51–53) list of 60 characteristic species of the arctic-alpine zone in New

Mexico indicates a much richer alpine flora in the Sangre de Cristo Range at the southern end of the Rocky Mountains more than three hundred miles eastward. The nearest alpine peaks of the main Rocky Mountains are in Colorado about two hundred and fifty miles northeast. Thirty-eight of the 50 alpine species on San Francisco Mountain are included in Cox's (4) list of 196 alpine species on James Peak, Colorado. The high plateau of Arizona, on which San Francisco Mountain is located, is almost continuous with alpine summits in southern Utah two hundred miles northward and connects on the southeast with the White Mountains one hundred and fifty miles distant and with mountains in western New Mexico.

RAUNKIAER'S LIFE-FORMS. The 48 alpine species of seed plants on San Francisco Mountain were grouped also according to Raunkiaer's (17) life-forms. Phanerophytes are absent above timberline, and only four life-forms are represented. Most of the species (40) are perennial herbs classed as hemicryptophytes. The remaining 8 are listed below according to life-form. The 5 species of chamaephytes are: *Geum turbinatum,* the abundantly represented, mat-forming species; *Silene acaulis,* a typical cushion species; *Arenaria sajanensis, Saxifraga caespitosa* subsp. *exaratoides* var. *Lemmonii,* and *Potentilla Sibbaldi.* The single cryptophyte or geophyte species is *Senecio franciscanus,* which is especially successful on rock slides because of its creeping rhizomes. There are only 2 species of therophytes or annual herbs, *Androsace septentrionalis* var. *subumbellata* and *Gentiana monantha.*

As others have noted, the distinction between chamaephytes and hemicryptophytes is not sharp, and a few of the species classed as the latter might as well have been called chamaephytes. At any rate, the prevailing life-form here is that of low perennial herbs with rosettes and stems which, often retaining bases of old leaves, elongate slightly each year.

The biological spectrum of the alpine zone of San Francisco Mountain and Raunkiaer's revised normal spectrum are compared below, with percentages of species under each life-form. The slightly higher percentage of chamaephytes above that of the normal spectrum indicates a cold climate intermediate between the temperate hemicryptophytic climate and the chamaephytic climate of arctic regions.

	Raunkiaer's revised normal spectrum Per cent	Alpine zone of San Francisco Mountain Per cent
Phanerophytes	46	0
Chamaephytes	9	10.4
Hemicryptophytes	26	83.3
Cryptophytes	6	2.1
Therophytes	13	4.2

List of Alpine Species

This study is limited to the vascular plants above timberline on San Francisco Mountain. All species normally found at some distance above the irregular line of the last stunted individuals of tree species were included, regardless of their occurrence in other zones. As it was sometimes difficult to determine whether a species should be classed as alpine, a partial list of subalpine species reaching the timber line or slightly beyond is included as evidence that these species were not overlooked. For example, the shrubby species *Juniperus communis* var. *sibirica* and *Ribes montigenum,* which occur in protected rocky situations slightly above the highest spruces and pines, are not typically alpine.

In naming the specimens the author wishes to acknowledge the valuable assistance of several specialists. The author made determinations at the herbarium of the Field Station of the Bureau of Plant Industry at Sacaton, Arizona, and at the United States National Herbarium. Specimens of certain groups were further checked by the following specialists: Pteridophyta by Dr. Wm. R. Maxon, Gramineae by Dr. J. R. Swallen and Prof. J. J. Thornber, *Carex* by J. W. Stacey, *Juncus* by Dr. F. J. Hermann, *Ranunculus* by Dr. Lyman Benson, and Compositae by Dr. S. F. Blake. Determinations of all the remaining specimens have kindly been checked by Dr. T. H. Kearney. Nomenclature is that of the forthcoming Flora of Arizona, by T. H. Kearney and R. H. Peebles. The names thus are in accord with the International Rules of Botanical Nomenclature and are conservative.

Duplicate sets of the author's specimens have been deposited in the United States National Herbarium, herbarium of the University of Arizona, herbarium of the Sacaton (Arizona) Field Station, and herbaria of the Forest Service at the following localities: Washington, D. C.; Albuquerque, New Mexico; Southwestern Forest and Range Experiment Station at Tucson, Arizona, and Fort Valley Experimental Forest near Flagstaff, Arizona.

The 49 alpine species of vascular plants of San Francisco Mountain, including a single pteridophyte and 48 species of flowering plants, are grouped into 35 genera and 17 families. Specimens of two additional species were undeterminable. Largest families are Caryophyllaceae (a family well represented at northern points and high elevations) with 8 species, Compositae with 7, and Gramineae with 6 species. Principal genera are *Arenaria* and *Saxifraga* with 4 species each and *Carex* and *Potentilla* with 3 each. Rydberg (20, p. 92–93) lists from San Francisco Mountain an additional species, *Lloydia serotina* (L.) Sweet, which is omitted here because no herbarium specimen from Arizona could be located. The species are listed below with brief notes on habitat and abundance. Geographic distribution or range is abbreviated as explained above.

POLYPODIACEAE

CYSTOPTERIS FRAGILIS (L.) Bernh. Crevices, alpine rock fields; common. CP.

GRAMINEAE

AGROPYRON SCRIBNERI Vasey. Loose rocks and gravel, alpine rock fields; scattered. The weak stems spread out in all directions over the rocks. RM.

FESTUCA OVINA L. var. BRACHYPHYLLA (Schult.) Piper. Alpine meadows and rock fields; common. CP.

PHLEUM ALPINUM L. Alpine zone, confined to climax alpine meadows; rare. CP.

POA REFLEXA Vasey & Scribn. Alpine zone, in meadows; rare. RM.

POA RUPICOLA Nash. Alpine meadows and rock fields; common. RM.

TRISETUM SPICATUM (L.) Richt. Alpine rock fields and meadows; common. CP.

CYPERACEAE

CAREX ALBO-NIGRA Mackenzie. Alpine rock fields and meadows; common. RM.

CAREX BELLA L. H. Bailey. Alpine rock fields and meadows; the most commonly represented species of *Carex*. Flowers from June to September. RM.

CAREX EBENEA Rydb. Alpine rock fields and meadows; common. RM.

JUNCACEAE

JUNCUS DRUMMONDII E. Meyer. This species, previously unrecorded for Arizona, was to be expected here, as it ranges from Alaska south in mountains to New Mexico and California. Rare in one alpine meadow at the upper end of the Inner Basin and commoner in nearby subalpine meadows. RM.

LUZULA SPICATA (L.) DC. Alpine meadows and rock fields; common. CP.

POLYGONACEAE

OXYRIA DIGYNA (L.) Hill. Shaded rock crevices of alpine zone; uncommon. CP.

CARYOPHYLLACEAE

ARENARIA FENDLERI A. Gray. Typical of lower elevations, a depauperate alpine form common in alpine rock fields. RM.

ARENARIA SAJANENSIS Willd. Alpine rock fields and meadows; common. CP.

ARENARIA SAXOSA A. Gray. Rock slides in alpine zone but more characteristic of lower zones; common. SW.

ARENARIA VERNA L. Alpine rock fields and meadows; common. Nearly all the plants are densely glandular pubescent, but rarely glabrous plants are found. CP.

CERASTIUM BEERINGIANUM Schlecht. & Cham. Alpine rock fields; very common. NA.

Sagina saginoides (L.) Britton. Alpine zone (*Knowlton 134*, U. S. National Herbarium); rare. Not collected by the author. CP.

Silene acaulis L. Alpine meadows and rock fields; commonly forming cushions or mats. CP.

Stellaria umbellata Turcz. Alpine rock crevices and meadows; uncommon. CP.

RANUNCULACEAE

Ranunculus inamoenus Greene var. alpeophilus (A. Nels.) L. Benson and var. subaffinis (A. Gray) L. Benson. Var. *subaffinis* is endemic to San Francisco Mountain. Alpine meadows and in mats of other plants; rare and scattered. RM.

Ranunculus sp. Alpine meadows and in mats of other plants; rare and scattered. An apetalous plant. Perhaps a reduced form of *R. pedatifidus* J. E. Smith, which sometimes lacks petals.

CRUCIFERAE

Draba aurea Vahl var. aureiformis (Rydb.) Schulz. Alpine rock fields; common. NA.

Draba crassifolia Graham. Alpine meadows; rare. NA.

Thlaspi Fendleri A. Gray. Alpine rock fields and meadows; common. SW.

CRASSULACEAE

Sedum rhodanthum A. Gray. Alpine meadows and rock fields; common. RM.

SAXIFRAGACEAE

Heuchera versicolor Greene f. pumila Rosend. *et al.* Alpine rock ledges and crevices and also in alpine meadows; common. SW.

Saxifraga caespitosa L. var. Lemmonii Engler & Irmscher. Forming mats on alpine ledges and rock fields and occasionally in alpine meadows; not common. CP.

Saxifraga debilis Engelm. Shallow soils in shaded crevices, alpine rock fields; uncommon. RM.

Saxifraga flagellaris Willd. Mainly in crevices of alpine rock fields; not common. CP.

Saxifraga rhomboidea Greene var. franciscana (Small) Kearney & Peebles. Alpine rock fields and meadows; uncommon and scattered in mats of other plants. Var. *franciscana* perhaps is not worthy of recognition, as it differs only in smaller size and more compact inflorescences. These differences apparently are associated with the alpine habitat. RM.

ROSACEAE

Geum turbinatum Rydb. *Sieversia turbinata* (Rydb.) Greene. Dominant in alpine meadows and a pioneer on rocks; by far the most abundantly represented species of flowering plants in the alpine area. RM.

Potentilla concinna Richardson. Alpine rock fields; uncommon. RM.

Potentilla diversifolia Lehm. Alpine rock fields and meadows; not common. RM.

Potentilla Sibbaldi Haller f. (*Sibbaldia procumbens* L.) In mats in alpine meadows and slightly below timberline; common. CP.

Umbelliferae

Pseudocymopterus montanus (A. Gray) Coult. & Rose. In alpine rock fields and also in alpine meadows; common. RM.

Primulaceae

Androsace septentrionalis L. var. subumbellata A. Nels. Alpine rock fields; common. CP.

Primula Parryi A. Gray. Alpine rock fields, including crevices and rock slides, and in meadows; common but scattered. RM.

Gentianaceae

Gentiana barbellata Engelm. Very rare and scattered in alpine meadows but more typical of lower zones. Plants above timberline are inconspicuous until they flower in September. RM.

Gentiana monantha A. Nels. In mats of other plants in alpine meadows; rare. RM.

Polemoniaceae

Polemonium confertum A. Gray. Alpine rock fields and also in meadows; common. RM.

Scrophulariaceae

Pedicularis sp. Rare in climax alpine meadows and common below timberline. Previously referred to *Pedicularis Parryi* A. Gray. However, Dr. Francis W. Pennell, whom I accompanied on a field trip here to collect additional material, is describing the San Francisco Mountain plant as a new, endemic species. EN.

Veronica Wormskjoldii Roem. & Schult. Commoner below timberline, rare in alpine meadows. NA.

Compositae

Antennaria aprica Greene. Alpine rock fields; uncommon. RM.

Antennaria umbrinella Rydb. Alpine rock fields and meadows; uncommon. RM.

Erigeron compositus Pursh. Reported previously from Greenland to Alaska and south to Colorado, Utah, Nevada, and California. Very rare in an alpine meadow and in rock cliffs at timberline. NA.

Erigeron simplex Greene. Previously known from Montana south to Colorado, New Mexico, and California. Though this species typically is radiate, some of the plants here are discoid or nearly so. Scattered and uncommon in mats of other plants in alpine meadows. RM.

SENECIO FRANCISCANUS Greene. Endemic to the alpine zone of San Francisco Mountain, where it is commonly represented on rock slides. Discovered in 1884, but the type was collected by Greene in 1889. EN.

SOLIDAGO CILIOSA Greene. Alpine rock fields and meadows; common. RM.

TARAXACUM sp. Possibly a new record for the state, but the scarce material was undeterminable. In mats of other plants in alpine rock fields; very rare.

PARTIAL LIST OF TIMBERLINE SPECIES

Specimens of the 24 additional species in this partial list of timberline species were collected by the author in the wind timber or subalpine meadows at timberline or slightly above.

Botrychium lanceolatum (S. G. Gmel.) Angstr.
Woodsia oregana D. C. Eaton
Juniperus communis L. var. sibirica (Burgsd.) Rydb.
Bromus ciliatus L.
Poa Fendleriana (Steud.) Vasey
Poa pratensis L.
Sitanion Hystrix (Nutt.) J. G. Smith
Carex Haydeniana Olney
Carex siccata Dewey
Luzula parviflora (Ehrh.) Desv.
Anemone globosa Nutt.
Aquilegia chrysantha A. Gray
Ribes montigenum McClatchie
Potentilla Hippiana Lehm. var. diffusa Lehm.
Potentilla subviscosa Greene
Rubus strigosus Michx. var. arizonicus (Greene) Kearney & Peebles
Geranium Richardsonii Fisch. & Trautv.
Viola canadensis L.
Epilobium angustifolium L.
Epilobium saximontanum Haussk.
Moneses uniflora (L.) A. Gray
Mertensia franciscana Heller
Penstemon Whippleanus A. Gray
Agoseris purpurea (A. Gray) Greene ?

SUMMARY

San Francisco Mountain, elevation 12,655 feet, is an isolated volcanic cone located about ten miles north of Flagstaff, Coconino County, northern Arizona. The highest point in the state, it has a disjunct alpine flora which is Rocky Mountain alpine and arctic-alpine circumpolar in relationships. Two plant associations are distinguished in the alpine zone here, the alpine rock field or lichen association on most of the rocky summit and the alpine meadow or *Geum turbinatum* climax association on limited, more favorable sites. Based upon collections by the author in 1938, 49 species of alpine vascular species and 24 additional timberline species are listed with brief notes on habitat and abundance. Four of these are previously unrecorded for the state: *Botrychium lanceolatum* (subalpine at timberline), *Juncus Drummondii, Erigeron compositus,* and *Erigeron simplex.*

Tucson, Arizona,
May, 1940.

LITERATURE CITED

1. BAILEY, VERNON. Life zones and crop zones of New Mexico. U. S. Dept. Agr. Biol. Surv., N. Amer. Fauna 35. 100 p., illus. 1913.
2. BRITTON, N. L. A list of plants collected at Fort Verde and vicinity and in the Mogollon and San Francisco mountains, Arizona, 1884–1888, by Dr. E. A. Mearns, U. S. A. N. Y. Acad. Sci. Trans. 8: 61–76. 1889.
3. COVILLE, FREDERICK V., and DANIEL T. MACDOUGAL. Desert Botanical Laboratory of the Carnegie Institution. Carn. Inst. Wash. Publ. 6. 58 p., illus. 1903.
4. COX, CLARE FRANCIS. Alpine plant succession on James Peak, Colorado. Ecol. Monographs 3: 299–372, illus. 1933.
5. GREENE, EDWARD L. New or noteworthy species VI. Pittonia 2: 13–24. 1889.
6. GREENMAN, J. M. Monograph of the North and Central American species of the genus Senecio—Part II. Mo. Bot. Gard. Ann. 4: 15–35. 1917.
7. HANSON, HERBERT C. A study of the vegetation of northeastern Arizona. Neb. Univ., Studies 24: 85–178, illus. 1924.
8. HARSHBERGER, JOHN W. Phytogeographic survey of North America. 790 p., illus. 1911.
9. HOFFMAN, W. J. The distribution of vegetation in portions of Nevada and Arizona. Amer. Nat. 11: 336–343. 1877.
10. HOLM, THEODORE. The vegetation of the alpine region of the Rocky Mountains in Colorado. Nat. Acad. Sci. Mem. 19 (3): 1–45, illus. 1927.
11. LEIBERG, JOHN B., THEODORE F. RIXON, and ARTHUR DODWELL. Forest conditions in the San Francisco Mountains Forest Reserve, Arizona. U. S. Geol. Surv. Prof. Paper no. 22, Series H, Forestry, 7. 95 p., illus. 1904.
12. LITTLE, ELBERT L., JR. Botrychium lanceolatum in Arizona. Amer. Fern Journ. 29: 36–37. 1939.
13. MERRIAM, C. HART. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado in Arizona. U. S. Dept. Agr. Div. Ornith. Mammal., N. Amer. Fauna 3. 136 p., illus. 1890.
14. ————. Life zones and crop zones of the United States. U. S. Dept. Agr. Div. Biol. Surv. Bull. 10. 79 p., illus. 1898.
15. NICHOL, A. A. The natural vegetation of Arizona. Univ. Ariz. Agr. Exp. Sta. Tech. Bull. 68: 179–222. 1937.
16. PEARSON, G. A. Forest types in the Southwest as determined by climate and soil. U. S. Dept. Agr. Tech. Bull. 247. 143 p., illus. 1931.
17. RAUNKIAER, C. The life forms of plants and statistical plant geography. 632 p., illus. 1934.
18. ROBINSON, HENRY H. The San Franciscan volcanic field, Arizona. U. S. Geol. Surv. Prof. Paper 76. 213 p., illus. 1913.
19. RUSBY, H. H. General floral features of the San Francisco and Mogollon mountains of Arizona and New Mexico, and their adjacent regions. N. Y. Acad. Sci. Trans. 8: 76–81. 1889.
20. RYDBERG, P. A. Phytogeographical notes on the Rocky Mountain region. II. Origin of the alpine flora. Torr. Bot. Club Bull. 41: 89–103. 1914.

MARY FISK SPENCER

Mary Fisk Spencer died in San Diego, California, December 27, 1940. She was within twelve days of completing her one hundredth year. For fifty of those years, in spite of weak eyesight and handicapped by poor health, she had been an indefatigable botanizer; from 1878 to 1914 in Central and Southern Europe, and from 1915 to 1928 in southern California, chiefly in the arid sections of San Diego County. Her collections are found in the leading herbaria of Europe and America and in the private herbaria of many specialists, especially in Europe. Her death marks the passing of an outstanding amateur botanist.

Mary Evelyn Fisk was born at Brecksville, Ohio, January 8, 1841, the daughter of John Shipley Fisk and Anne Clapp Clark, both of whom were from New England. Her father, a master machinist, changed his residence frequently, being in charge successively of iron works in Knoxville, Tennessee, Franklin Falls, Ohio, and Cleveland, Ohio. As a result of change of residence and financial difficulties Miss Fisk's education was badly interrupted. When she was fifteen she enrolled in the Preparatory Department of Oberlin College, which was then almost the only coeducational institution in the middle west, if not in the entire country. A year of teaching followed, after which she enrolled in the Literary Department of the College for the years 1858–1859 and 1860–1861. A bank failure put an end to her college work.

Miss Fisk was musically gifted and while at Oberlin must have received considerable musical instruction, since, then as now, Oberlin was giving great attention to music. During the early eighteen-sixties she taught private music classes in and about Cleveland, but about 1865 was able to enter the old Boston (Massachusetts) Music School for study under B. F. Baker; she graduated there, then taught music privately in Boston. However, she wanted further training and by 1874 was studying at the Royal Conservatory of Music in Munich, Germany. After two years of strenuous work she suffered a nervous breakdown, and was thereafter compelled to lead an outdoor life.

During this period of European study she met James MacGoffin Spencer, who had gone to Munich in 1874 to study chemistry. They were married on July 28, 1878, and until September 1914, when they returned to the United States to live, resided in Munich. Mr. Spencer had been for six years Professor of Mathematics in the National Deaf and Dumb College in Washington, D. C. After a severe illness he was obliged to lead a life of leisure, which he diversified by travel and study. Thus it was necessary for both Mr. and Mrs. Spencer to have a rather quiet, outdoor life; and their means, though modest, permitted extensive travel.

During the years that Miss Fisk was in Oberlin she became a devoted admirer of Dr. James Dascomb (M. D. Dartmouth, 1833),

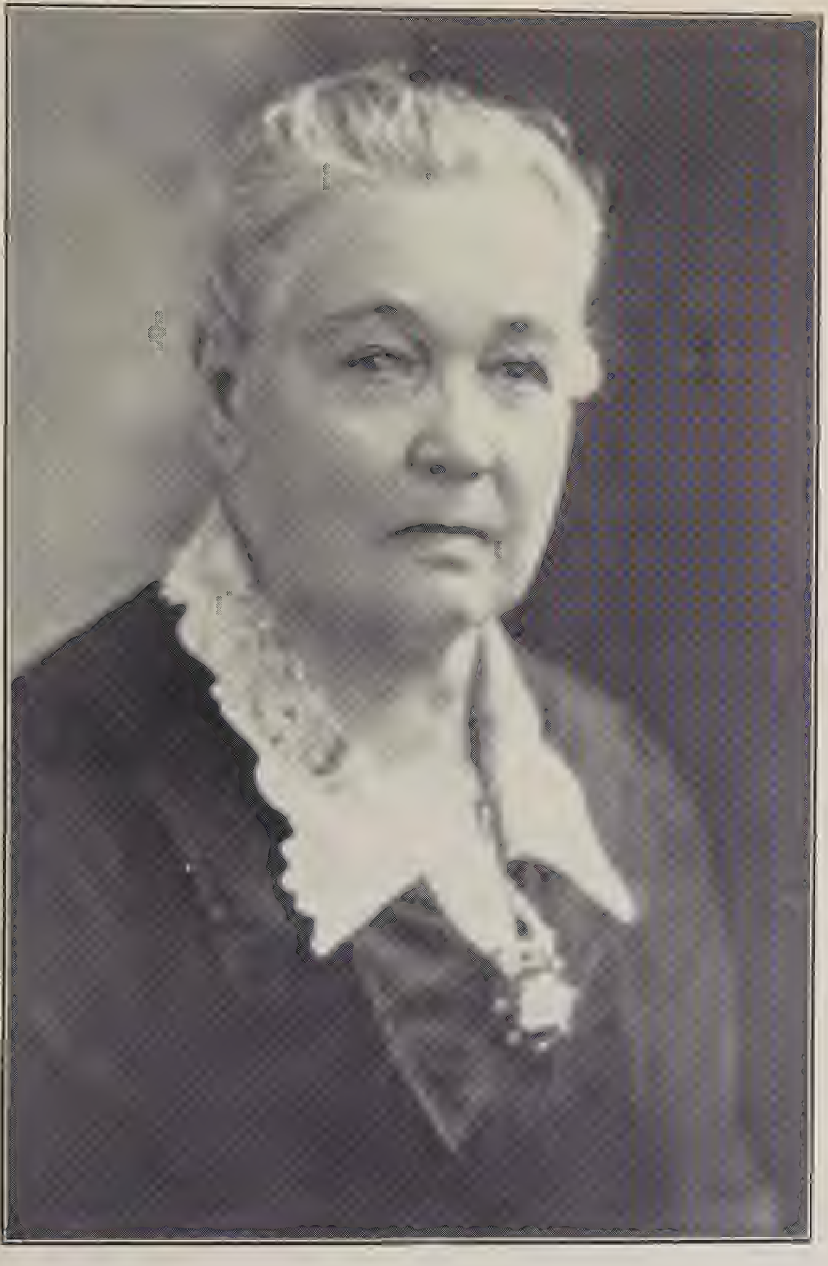

PLATE 6. MARY FISK SPENCER. Photograph taken about 1925.

who was "Professor of Chemistry, Botany and Physiology" at Oberlin from 1834 to 1878, and Librarian from 1855 to 1873. Through his influence she developed a love of botany, which after her marriage became a life passion. In company with her husband she visited most of the countries of Central and Southern Europe, and wherever she went she made extensive collections of the native flora. These collections she exchanged with leading botanists and herbaria, and thus assembled a herbarium of more than 12,000 sheets of vascular plants, chiefly from Central and Southern Europe, with a few from Norway, the British Isles, North Africa and Asia Minor.

This herbarium was later presented to Oberlin College. It constitutes the chief part of the European section of the College Herbarium which now contains about 100,000 sheets of vascular plants, and 50,000 of nonvascular plants, housed in steel, mothproof cases in a fireproof addition to the present botany building. In November 1900 in a letter to Professor Albert A. Wright of Oberlin, who had been Professor of Geology, Botany and Zoology after Dr. Dascomb's retirement, Mrs. Spencer wrote "I have been collecting for over twenty years, and have a large proportion of the plants of Central Europe which I intend, after I shall have made the collection as complete as I can, to present to Oberlin as an expression of affectionate regard for our dear Prof. Dascomb of blessed memory." Although her sight and health were even then failing she continued to build up her herbarium, the first installment of which was given to the College in 1908. She stipulated that the collection be maintained as a separate unit, and be called "The Spencer collection of European Plants, in memoriam Professor James Dascomb." She herself was in the United States from 1908 to 1910 to visit friends and to supervise the installation of the herbarium. She returned to Europe in the fall of 1910, where she continued to reside until just after the outbreak of the first world war. Three years of this time were spent in Corsica, where she made extensive collections that were later given to Oberlin.

After January, 1915, Mrs. Spencer resided in San Diego, California, until her death there on December 27, 1940. Mr. Spencer died May 13, 1920, in Burlington, Vermont.

In the arid and semiarid areas of San Diego County, Mrs. Spencer found a new and intensely interesting flora. Until her eyesight and health failed completely in 1927 she spent weeks at a time at all seasons of the year collecting in the desert regions as far south as the Mexican border. Many of the plants which she herself was unable to identify were determined at Gray Herbarium, a few by Dr. Greenman at the Missouri Botanical Garden and some of her last collections by Miss Fidella G. Woodcock, Curator of Plants in the Natural History Museum, San Diego. Soon after arriving in San Diego, she become acquainted with Mr.

C. H. Orcutt, from whom she obtained much assistance. A complete set of her California collections, with some from Arizona were also given to Oberlin College, the last installment being received in February, 1928. There were approximately 3000 numbers, many species being represented by several specimens collected in different seasons, at different altitudes, and from different ecological areas. Frederick Grover, Oberlin College, Ohio.

NEW SPECIES OF VASCULAR PLANTS FROM THE NORTHWEST COAST

George Neville Jones

During the preparation of a manual of botany of the Northwest Coast, covering the vascular flora of the region west of the Cascade Mountains from British Columbia to Oregon, two additions to the number of described species must be recorded and a new nomenclatural transfer is necessary at this time. In citing specimens, the following abbreviations are used: Gray Herbarium of Harvard University (G); Missouri Botanical Garden (Mo); University of Illinois (UI).

In treating the willows of the area west of the Cascade Mountains it has been necessary to re-examine that small group of species closely related to *Salix Geyeriana* Anderss. The conclusion has been reached that the willow of this group occurring west of the Cascade Mountains is specifically distinct from the eastern Washington and Rocky Mountain *S. Geyeriana,* and the following nomenclatural combination is herewith proposed:

Salix meleina (J. K. Henry) comb. nov. *S. Geyeriana* Anderss. var. *meleina* J. K. Henry, Fl. So. Brit. Columbia 98. 1915. *S. Geyeriana meleina* Ball, in Abrams, Ill. Fl. Pacific States 1: 506. 1923.

Salix Geyeriana is a smaller shrub with densely glaucous branchlets, the pubescence of the leaves is whitish-sericeous, the capsules somewhat longer, and the style obsolete. It is not known to occur west of the Cascade Mountains.

Delphinium splendens sp. nov. Herba perennis; radicis fibris elongatis vel subfusiformibus, lignosis; caulibus strictis 1–2 m. altis, simplicibus, glaucis, fistulosis; foliis palmatim 5–7-lobatis, 10–30 cm. latis; racemis elongatis, pedicellis glabris, quam floribus longioribus, adscendentibus; floribus 15–20 mm. longis; sepalis caerulescentibus, intus glabris, extus puberulis; calcare 8–10 mm. longo, patente vel ad apicem subcurvato; petalis 4, albicantibus, spatulatis, obtusis, 8–10 mm. longis, lamina ungueque hirtulis; staminibus ca. 25; antheris ovalibus 1.5 mm. longis; folliculis 3, erectis, rectis, glabris vel subglabris, tenuiter reticulato-venulosis, 7–12 mm. longis, ad apicem nempe truncatis, in stylum abrupte abeuntibus; pedicellis fructigeris erectis vel adscendentibus; seminibus 3 mm. longis, costis in alas hyalinas productis.

Perennial; stem glaucous, leafy, simple, glabrous throughout, hollow, 1–2 m. tall, arising from a fascicle of elongate or somewhat fusiform woody roots; leaves palmately 5–7-lobed, 10–30 cm. broad, cleft about half way to the middle into oblanceolate, coarsely dentate, cuneate-based acute lobes, dark green, sparsely pilosulous above especially along the veins, pale green and grayish pilosulous-puberulent beneath; petioles glabrous, 10–15 cm. long, longer than the blades; racemes narrow, many-flowered, 25–50 cm. long; pedicels glabrous, slender, not longer than the flowers, the lower ones 8–15 mm. long at flowering time, ascending; flowers 15–20 mm. long; sepals dull blue, green-veined, glabrous within, puberulent outside; spur 8–10 mm. long, puberulent outside, acutish or obtuse, straight, horizontally spreading, or very slightly curved toward the tip; petals 4, whitish, spatulate, obtuse, 8–10 mm. long, the blade and claw hirsutulous; stamens about 25; anthers oval, 1.5 mm. long, glabrous; filaments 3–5 mm. long, translucent, dilated below, glabrous to sparsely pilosulous; follicles 3, erect, straight, glabrous or nearly so, somewhat reticulate-veiny, 7–12 mm. long, the style 3–4 mm. long, the follicle somewhat truncate at the apex, abruptly terminating in the style, the fruiting pedicels erect or ascending; seeds 3 mm. long, the angles produced into hyaline wings. The synonymy is as follows:

Delphinium scopulorum glaucum sensu Piper, Contr. U. S. Nat. Herb. 11: 280. 1906, Henry Fl. So. Brit. Col. 138. 1915; *D. glaucum* sensu Piper & Beattie, Fl. N.W. Coast 160. 1915, G. N. Jones, Univ. Washington Publ. Biol. 5: 153. 1936, *op. cit.* 7: 82. 1938, not Wats. Bot. Calif. 2: 427. 1880.

ALASKA: Chilkat Valley, *Walker 1070* (Mo). WASHINGTON: [Mount Rainier] Upper Valley of the Nisqually, July 14, 1896, *O. D. Allen 248* (type UI, isotype Mo); Swauk River, *Sharples 78* (UI); Yakima County, *Brandegee 615* (UI); Olympic Mountains, *Elmer 2577* (Mo), *Piper* in 1890 (Mo), *G. N. Jones 10735* (UI).

This northwestern larkspur has been passing as *Delphinium glaucum* Wats., a species described from the Sierra Nevada of California in 1876. It grows in subalpine meadows and along streams in the Cascade and Olympic mountains, from Alaska to Oregon. From the Californian *D. glaucum,* this newly described plant differs principally in its smaller flowers, shorter spurs, shorter pedicels, the smaller whitish petals, glabrous anthers, shorter filaments, shorter follicles with a truncate apex, and the leaves being sparsely pilosulous above and less deeply lobed. It is possible, in fact, to identify sterile specimens by the leaf-characters alone.

Sedum nesioticum sp. nov. Perenne, rosulatum, rhizomate horizontali lignoso; caulibus erectis, e basi excurvantibus, 10–30 cm. altis, vulgo sub anthesi aphyllis; foliis plerumque basilibus, numerosis, aggregatis nec non imbricatis, rosulatis, lineari-lanceolatis, teretibus vel subteretibus, succulentis, bene epapillatis, laete viridibus, nunquam scariosis, 1.5–3 cm. longis, integris; cymis effusis, 4–10 cm. latis, 3–7 dichotomis, floribus pulchre luteis, secundis; petalis discretis, lanceolatis, ca. 1 cm. longis; sepalis aequalibus, lanceolatis, acutulis, 5 mm. longis; staminibus quam petalis subbrevioribus; antheris 1 mm. longis; folliculis 6–7 mm. longis, apice subulato suberecto; seminibus obovoideis, levibus, 1 mm. longis.

Perennial, tufted, with a woody horizontal rhizome; stems erect, curved upward at the base, 10–30 cm. tall, usually leafless at flowering time; leaves chiefly basal, numerous, crowded but not imbricated, tufted, linear-lanceolate, terete or nearly so, succulent, smooth, not at all papillate, bright green, not becoming scarious, 1.5–3 cm. long, entire; cyme loose, 4–10 cm. broad, 3–7-forked, the branches becoming divergent or even somewhat recurved, the short-pedicelled bright yellow flowers secund upon the branches; petals distinct, lanceolate, acute or acuminate, about 1 cm. long; sepals equal, lanceolate, acutish, smooth, 5 mm. long; stamens slightly shorter than the petals; anthers 1 mm. long; follicles 6–7 mm. long, the subulate tips suberect; seeds obovoid, smooth, striate, 1 mm. long.

British Columbia: rocky bluffs, Victoria, July 21, 1918, *W. R. Carter; C. F. Newcombe 23* (G). Washington: islets, Gulf of Georgia, *L. F. Henderson 1686* (type, G); Friday Harbor, *S. M. & E. B. Zeller 808* (G); cliffs, Waldron Island, *H. C. Cowles 475* (G, Mo).

This newly described Puget Sound plant is not accounted for in Fröderström's recent monograph (Acta Horti Gothoburgensis 5–10, App.:1930–1936) or in the revision of the North American species by Britton & Rose (N. Am. Fl. 22: 7–74. 1905). It is evidently related to *Sedum stenopetalum* Pursh, for which it has commonly been passing, but it is a larger plant than that species. It can be distinguished in the herbarium by the facts that the leaves and sepals are perfectly smooth, not at all papillate, and that the inflorescence is larger and with the branches more divergent. The petals are longer, acute or acuminate, but not mucronate. The carpels are somewhat larger. So far as is known at the present time *S. nesioticum* is confined to the islands of the northern part of Puget Sound and adjacent British Columbia, hence the specific name. *Sedum stenopetalum* Pursh is a perfectly distinct species growing in the mountains from Alberta to New Mexico, and extending as far westward as eastern Washington.

University of Illinois, Urbana,
September 26, 1940.

NOTEWORTHY PLANTS FROM IDAHO

Arthur Cronquist

During the summer of 1939 the writer had opportunity to make extensive collections in Clark and Fremont counties, Idaho. Several specimens apparently represent plants previously not known to occur in the state and others represent range extensions within the state. All numbers cited are the author's own collections and, unless otherwise noted, duplicates of each number have been deposited in the herbaria of the Utah State Agricultural College, Logan, (UtS), the Missouri Botanical Garden (MB), and the University of Idaho, Southern Branch, Pocatello.

Agropyron Saundersii (Vasey) Hitchc. is recorded by Hitchcock (4) from only two localities, Veta Pass, Colorado, and Salt Lake City, Utah. It was collected in Fremont County three times during the season: along the Idaho-Wyoming border near Squirrel Creek east of Ashton, *1686* (UtS, MB); along railroad tracks at St. Anthony, *1773;* subalpine north slopes of Mount Jefferson, southwest of Henry's Lake, *1874*. At the last mentioned station the species was growing intimately with *Agropyron Scribneri* Vasey, but without apparent intergradation.

Agropyron Scribneri Vasey is recorded by Hitchcock (4) from Montana, Wyoming, Utah, and Nevada, among other states, but not from Idaho. It was collected on subalpine slopes of Mount Jefferson, Fremont County (*1873*).

Carex Hepburnii Boott is not recorded by Mackenzie (6) from Idaho although he mentions having seen specimens from all bordering states except Utah. The species was collected at 9000 feet on rocky, subalpine slopes east of Mount Jefferson, Fremont County (*1891*).

Carex occidentalis L. H. Bailey is recorded by Mackenzie (6) from Utah, Nevada, and southward. The species was collected under an open stand of limber pine, at 9500 feet, on a high ridge above West Camas Creek, north of Kilgore, Clark County (*1443*); it was associated with *Poa epilis* Scribn. and with several other species of *Carex*.

Cardamine unijuga Rydb. is recorded by Rydberg (8) from Wyoming and Montana. It was collected in standing water an inch or so deep at the edge of Big Springs, Fremont County (*1599*).

Saxfraga oppositifolia L. is known in western United States from comparatively few stations. Fernald (1, p. 7) presents a range map showing collections apparently from the Wind River Mountains of Wyoming, Yellowstone Park and adjacent Montana, and again from what appear to be the Bitterroot Mountains, along the Idaho-Montana border. The specimen was found growing in dense extensive mats at 10,000 feet on north exposures just below the continental divide a mile southeast of the summit of Mount Jefferson, Fremont County. It was almost entirely past flowering at the time of collection (August 1) and hence is represented by only a single scanty sheet (*1906*, UtS).

Euphorbia Esula L. is a recent introduction from Europe. Hanson and Rudd (3) record it from two localities in Idaho, one from the panhandle at the north end of the state, the other apparently from the vicinity of Kilgore, Clark County. It was collected along the roadside near Medicine Lodge Creek, north of Small, Clark County, about forty miles west of the Kilgore station (*1931*).

Penstemon Whitedii Piper subsp. tristis Pennell & Keck is recorded by Keck (5) from the Salmon River twenty-three miles above Salmon City, and from several localities in Custer County, as far east as Mackay. This species was collected on an isolated sandstone outcrop in a limestone region north of Spencer, Clark County (*1339*); it was associated with *Hackelia patens* (Nutt.) Johnst., *Phacelia leucophylla* Torr. and *Castilleja fasciculata* A. Nels. It was not seen elsewhere in the area.

Brickellia oblongifolia Nutt. subsp. **typica** comb. nov. *B. oblongifolia* Nutt. var. *typica* Robins. Mem. Gray Herb. 1: 104. 1917.

Brickellia oblongifolia Nutt. subsp. **linifolia** (Robins.) comb. nov. *B. oblongifolia* Nutt. var. *linifolia* Robins., Mem. Gray Herb. 1: 104. 1917.

This subspecies is recorded by Robinson (7, p. 104) from Colorado, Utah, and southward, the Idaho area supposedly being occupied by subsp. *typica*. A collection from the south side of basalt rocks in St. Anthony City Park, Fremont County (*1474*) is apparently subsp. *linifolia*. A previous collection from the same station (*687*) is transitional to subsp. *typica*. It appears that subsp. *linifolia* is the more southerly representative of the species and that the collections cited above represent an extreme northward extension of its range. The habitat from which the specimens were taken simulates very closely what might be expected in hotter and drier more southern localities. In view of this difference in range var. *linifolia* Robins. may now be given subspecific status.

Chrysothamnus nauseosus (Pall.) Britt. subsp. glareosus (Jones) Hall & Clem. is recorded by Hall and Clements (2) from southern Utah and northern Arizona. A collection from the United States Sheep Station, near Dubois, Clark County (*1995*), agrees with this form in the glabrous achenes and puberulent involucres, but is taller than reported by Hall and Clements (6 or 8 dm. instead of 3 dm.). A previous collection (*854*) from the same station was made in 1937. The plant is not generally distributed through the area, and was found only on a lava reef near the station headquarters.

CHRYSOTHAMNUS NAUSEOSUS (Pall.) Britt. subsp. LEIOSPERMUS (Gray) Hall & Clem. is recorded by Hall and Clements (2) from southern Utah, southern Nevada, and the borders of California. A form having slightly wider leaves than are accorded to this subspecies, but otherwise agreeing fairly closely with the description given by Hall and Clements, was collected on the southern exposure of an extremely dry limestone cliff below the forks of Irvin Creek, northeast of Argora (*1965*). It will be noted that both of the *Chrysothamni* referred to above have glabrous achenes, an uncommon character in *C. nauseosus,* and that both were collected in extremely dry rocky situations, more or less simulating the normal habitat of the plants in more southern areas. It is suggested that further exploration may reveal these supposedly southern forms to be more widespread than has been previously believed, occurring in hot dry areas often passed up by collectors as being unworthy of inspection.

CHRYSOTHAMNUS PARRYI (Gray) Greene subsp. HOWARDII (Parry) Hall & Clem. is reported by Hall and Clements (2) from Wyoming and adjacent states, but not from Idaho. This subspecies is apparently represented by a collection from Red Conglomerate Peaks, east of Argora, Clark County (*1940*). The plants, growing on bare rocks at 9500 feet, are much reduced and superficially resemble certain species of *Haplopappus* more than *Chrysothamnus.* The upper leaves are distinctly elongate and surpass the heads as in subsp. *Howardii* but the leaves are more nearly glabrous as in subsp. *attenuatus* (Jones) Hall & Clem. Other characters are more nearly those of subsp. *Howardii,* and the collection is with some hesitancy so referred.

Intermountain Herbarium,
Utah State Agricultural College, Logan,
March 7, 1940.

LITERATURE CITED

1. FERNALD, M. L. Recent discoveries in the Newfoundland flora. Rhodora 35: 1–16. 1933.
2. HALL, H. M. and F. E. CLEMENTS. The phylogenetic method in taxonomy: the North American species of Artemisia, Chrysothamnus, and Atriplex. Carnegie Inst. of Wash., Washington, D. C. 1923.
3. HANSON, H. C. and V. E. RUDD. Leafy spurge, life history and habits. North Dakota Agric. Exper. Sta. Bull. 266: 1–24. 1933.
4. HITCHCOCK, A. S. Manual of the grasses of the United States. United States Dept. of Agric., Misc. Publ. no. 200. 1935.
5. KECK, D. D. Studies in Penstemon VI. The section Aurator. Bull. Torr. Bot. Club 65: 233–255. 1938.
6. MACKENZIE, K. K. Cyperaceae. North American Flora 18: 1–478. 1931–1935.
7. ROBINSON, B. L. Monograph of the genus Brickellia. Mem. Gray Herbarium 1: 1–151. 1917.
8. RYDBERG, P. A. Flora of the Rocky Mountains and adjacent plains. New York. 1917.

THE ALASKA CEDAR IN CALIFORNIA

Herbert L. Mason

Many rumors have been current relative to the occurrence of both the Alaska cedar, *Chamaecyparis nootkatensis* (Lamb.) Spach, and the western larch, *Larix occidentalis* Nutt., in California. These rumors have been particularly tantalizing since the descriptive evidence seemed so convincing. However, they were not vouched for by specimens. Recently, a collection from northwestern California clearly demonstrates the occurrence of *Chamaecyparis nootkatensis* in our flora. Mr. Oliver V. Matthews of Salem, Oregon, collected the species in 1939 on the northeast slope of Mount Emily in northwestern Siskiyou County and Dr. Doris Gillespie Niles of Humboldt State College, reports having seen it on Little Grayback farther to the west. Both localities are a little over two miles south of the Oregon line. Specimens of the Mount Emily material are deposited in the herbarium at Rancho Santa Ana Botanic Garden, Anaheim, California. Mr. Matthews reports that at Mount Emily the plants are associated with *Abies shastensis, Picea Breweriana, Pinus monticola, Libocedrus decurrens* and *Taxus brevifolia*.

Department of Botany, University of California,
Berkeley, February 15, 1941.

REVIEWS

The Ferns and Fern Allies of Wisconsin. By R. M. Tryon, N. C. Fassett, D. W. Dunlop, M. E. Diemer. Frontispiece. Pp. v + 158 with 214 figures and 76 maps. Published by the Department of Botany, University of Wisconsin, Madison. May, 1940. Price $1.00.

The work treats three families of ferns and five families of fern allies as they occur in Wisconsin. The introduction contains directions for the use of the keys and closes with a well directed plug for the American Fern Society. A brief statement of the meteorology, geology, and physiography of Wisconsin precedes the taxonomic treatment. The keys are replete with references to text figures illustrating the terminology, a practice which should facilitate their use. The illustrations are largely halftones, most of which are from excellent photographs; a few have suffered somewhat at the hands of the printer in that their blackness often obscures the detail. Drawings are well done and excellently reproduced. Distribution maps, which are liberally used, give a clear picture of the range of each species. In some cases the limestone areas are mapped showing the correlation between the distribution of the species and the occurrence of limestone. The value of such maps cannot be overestimated. They serve a very useful purpose in interpreting the plant geography of the region as well as in directing botanists to areas where further field work is needed. The chores of the four-fold authorship are divided between a fern specialist, a director of the project, an illustrator

PLATE 7. CHAMAECYPARIS NOOTKATENSIS. A group of small trees (foreground) on Mount Emily, Siskiyou County, California. Photograph by Oliver Matthews.

and a photographer. Over all, an angel spread his wings—Martin J. Gillen, "a loyal alumnus, an enthusiastic conservationist." We wish to encourage more such works and more such angels.—Herbert L. Mason.

Forests and Trees of the Western National Parks. By Harold E. Bailey and Virginia Long Bailey. Pp. x + 129 with 71 text figures. Conservation Bulletin no. 6, National Park Service. United States Government Printing Office, Washington, D. C. 1941. Paper, $.25.

This valuable contribution to the literature of the national parks begins with a short introductory discussion of forest conservation, life zones, structure and functions of a tree and plant associations. The three general forestal regions (Pacific Slope, Rocky Mountain, Southwestern) in which the western national parks are located are briefly characterized. The forest associations and topographic features of the western parks, including those of Alaska and Hawaii, are then treated in some detail. Field keys to the genera and species of trees, non-technical descriptions and general information amount to approximately one-half of the content. A well-selected bibliography and an index to the common and scientific names complete the volume which is printed in clear type and beautifully illustrated with half-tones from photographs. The authors are to be congratulated on this attractive and readable booklet which will be very much appreciated by botanists and foresters as well as by the vacationing public.—Ethel Crum.

A Manual of the Higher Plants of Oregon. By Morton E. Peck. Pp. 1–866, with 1 plate, 1 map and 90 figures. Binford & Mort, Portland, Oregon, 1941. Price $5.00.

The appearance of a usable manual covering the flora of any state which has not previously been so endowed is an event of the utmost interest to all students of plants. Especially is this true when the book is as thoroughly excellent and generally attractive as this one! There has, heretofore, never been any manual or combination of manuals which would permit satisfactory determination of plants from all parts of Oregon. Furthermore, no one previously has attempted to gather into one volume the various entities described from the state since the appearance of Howell's "Flora of Northwest America," about forty years ago. A very rough tabulation indicates that approximately 250 of these recently described entities, including two genera, collected into the present book, have never before been available in a manual or flora. If the author had performed no other service than to glean these from the scattered literature, characterize them fully and key them out, he would merit unstinted gratitude.

Even those persons who have had considerable experience with the vegetation of the area in question will, I am sure, be amazed at the size of its flora, as revealed in the present volume.

There are included 118 families, 701 genera and 3203 species—more than three-fourths the number of species recorded from California in Jepson's "Manual," in 1925. The area of Oregon is only three-fifths that of California. This suggests a degree of diversity for the flora of Oregon at least equal to that of the California flora, which has long been famous for its high degree of diversity coupled with remarkable endemism.

An introductory survey of the physiographic and floristic features subdivides Oregon into the following nine major "plant areas": northern coast, northern coast mountain, Willamette Valley, Rogue-Umpqua, southern coast, southern coast mountain and Siskiyou, Cascade, eastern Oregon (with five subordinate sections) and Blue Mountain. These represent the remarkable blending of at least six floristic elements: the northwestern coniferous forest, the Cascade, the Rocky Mountain, the Great Basin, the Californian and the Klamath-Siskiyou, a fact which helps to explain the large number of species native to the state. Each area is briefly summarized as to topography, geology, climate and plant assemblages. Important concentrations of endemic species are shown to occur particularly in the Siskiyou and southern coast mountains, Wallowa and Steens mountains, and in the gorges of the Columbia and Snake rivers. This excellent summary is made particularly valuable by the author's thorough familiarity over a long period of years with nearly every corner of the state.

The book is attractively bound in green cloth and is so firmly constructed that it should hold up well even under intensive field usage. Each family, genus and species is carefully keyed out, and for each species there is provided an English name, a full description, and a brief expression of its local and general range. The author bravely discards the traditional "Oregon Myrtle," often claimed locally to be "native only to Oregon and the Holy Land," for the more accurate "California Laurel." All subspecific entities are given the status of "variety," necessitating most of the new combinations proposed. The International Rules are strictly adhered to in the matter of capitalization of all specific epithets which are derived from personal names, or are generic or vernacular names. There is a notably large glossary of technical terms accompanied by ninety helpful illustrations of plant parts; thirty-six pages of index to families, genera and species, including both technical and English names, and their synonyms, conclude the volume.

Mr. J. William Thompson has contributed the entire manuscript for the Pteridophyta and various specialists have prepared keys, or have aided with determinations or advice. The bulk of the taxonomic treatment, however, represents the author's painstaking effort to weigh everything that has been written about Oregon plants against his own sound taxonomic judgment and his unrivalled knowledge of the area of which he writes. The manual is the culmination of many years of devotion to the flora of the state, and is based largely upon his own extensive collections, now permanently housed at Willamette University, Salem, Oregon.

From the fine quality of the book, one would not suspect the handicaps under which it was conceived and carried out. Much of the bibliographical work had to be concentrated into infrequent visits to the larger botanical centers, and herbarium study had necessarily to be limited chiefly to the author's personal collections. Dr. Peck's achievement is a credit to his own ability and perseverance, and should greatly encourage in the Pacific Northwest the study of the science to which he has given so many years of his life. Systematic botany in Oregon will henceforth be sharply divided into the period *before* and that *after* the appearance of this book. The author has provided a point of reference and of departure for all future work in the state, an achievement whose value can scarcely be overestimated. This manual will stand as a perpetual challenge to those in the smaller institutions and elsewhere, who imagine themselves unable to carry on productive work because of the lack of facilities or funds, or because of their isolation from the centers of scientific activity. Such obstacles have failed to prevent Dr. Peck from making a brilliantly successful contribution to systematic botany.—L. CONSTANCE.

NOTES AND NEWS

FIELD WORK OF THE BUREAU OF PLANT INDUSTRY IN NEVADA. For years it has seemed desirable to gather up the rapidly vanishing plant lore of the Indians in Nevada. Stimulated by the interest of officials of the Office of Indian Affairs in Nevada and by the University of Nevada, a special project was initiated by the Bureau of Plant Industry which is interested in the plants themselves. From this have ramified various excellent projects. Since a wide knowledge of the state flora was necessary for the basic organization of the other data, the collection and classification of the flora became almost the primary concern. The work has continued for four years, beginning in 1937, and during that time several subsidiary projects have been undertaken.

During the first year there were six groups of collectors, most of them hired merely as collectors, who were sent out in pairs to different sections. There were six other collectors who travelled alone or with an assistant. Among these, under the general direction of W. A. Archer of the Bureau of Plant Industry were: Roy A. Allen, Tim Louise Breene, George E. Franklin, Jr., Frank S. Goodner, Newell F. Hancock, William G. Henning, James R. Henrichs, Philip A. Lehenbauer, Ira LaRivers, Lauritz Lund, William E. McKenzie, Mrs. Edith V. A. Murphey, Loretta R. Miller, Benjamin O. Moore, Norman E. Nichols, Benjamin A. Rives, Harry Sampson and Percy Train. After the first year the collections were made by Dr. Archer and Mr. Train.

The total herbarium collection from the project is 13,798 items, many in duplicate so that much has been left for exchange after the first set was deposited at the University of Nevada and the second in the herbarium of the United States National Arboretum at Washington, D. C. The material is also represented at the Gray Herbarium, New York Botanical Garden, St. Louis Botanical Garden, University of California, Stanford University, Catholic University of America, and the Field Museum of Natural History. The labels which appear on these plants give no indication that the work was done under the supervision of the United States Department of Agriculture so that the material will need to be identified merely by the year and the name of the collectors, which have been indicated above.

Practically all of the identifications have been done by S. F. Blake, C. O. Erlanson, O. M. Freeman, F. R. Fosberg, F. J. Hermann, Robert F. Martin, C. H. Muller and J. R. Swallen all of whom are members of the staff of the Division of Plant Exploration and Introduction. Certain special groups have been identified by experts outside the Division: *Cruciferae* by C. Leo Hitchcock, *Salix* by Carleton R. Ball, *Gilia* by Edgar T. Wherry, *Umbelliferae* (in part) by Mildred Mathias, and *Scrophulariaceae* (in part) by Francis W. Pennell.

More recently, as a result of this work, the Division of Plant Exploration and Introduction has started issuing a mimeographed series known as "Contributions toward a Flora of Nevada." This work is being done by the botanists of the Division in cooperation with the Work Projects Administration of Nevada. It is planned to continue these contributions until all of the plant families of Nevada have been covered. Up to the present there have been about thirty contributions completed, most of them being smaller families, but work is in progress on some of the larger families.—W. ANDREW ARCHER.

THREE ALIEN PLANTS NEW TO OREGON. The following notes are based on collections made in the vicinity of Portland, Multnomah County, Oregon. The three plants appear not to have been reported hitherto from North America. The specimens cited are deposited in the Gray Herbarium, Harvard University (G), the University of California Herbarium (UC), or the herbarium of the State College of Washington (WS).

CNIDIUM MONNIERI (L.) Cuss. Presumably on ballast, Albina, October 25, 1900, *Suksdorf 2926* (UC, WS). Adventive from Asia, and apparently not persisting here.

MESSERSCHMIDIA SIBIRICA L. (Determined by Ivan M. Johnston.) On ballast, Peninsula Docks, bank of Willamette River at St. John, July 10, 1936, *Constance 1801* (G, WS). The species was obtained from a similar situation by Suksdorf, many years ago, and is apparently persisting but not spreading.

Lapsana apogonoides Maxim. (Determined by G. L. Stebbins, Jr.) Forming ground cover with *Lysimachia Nummularia* under *Fraxinus* and *Salix* at edge of *Carex* bog, four miles north of Burlington ferry, Sauvies Island, May 28, 1940, *Constance & Beetle 2677* (UC).—L. Constance.

PROCEEDINGS OF THE CALIFORNIA BOTANICAL SOCIETY

March 15, 1941. The annual dinner of the California Botanical Society was held at the Berkeley Women's City Club, Berkeley, on Saturday evening, at 6:30 o'clock. Seventy-three members and their guests were present for the banquet. Professor E. B. Babcock, President, acted as toastmaster, and introduced Dr. D. H. Campbell, Dr. G. J. Peirce, Professor H. E. McMinn, Dr. Ira L. Wiggins, and Mrs. S. B. Parish, who sat at the speakers' table. Professor H. E. McMinn, Professor of Botany, Mills College, Oakland, was the speaker of the evening. The subject of his address was "Botanical Developments in the East Bay Regional Parks." He traced the history of the acquisition and development of the parklands owned by the East Bay Metropolitan Area, emphasizing particularly their botanical and recreational possibilities. The thoroughly enjoyable evening was in charge of the program committee: Dr. G. Ledyard Stebbins, Jr., chairman; Dr. Adriance S. Foster, and Miss Beryl Schreiber, with valuable assistance from Mrs. E. B. Babcock, Mrs. H. L. Mason and Mrs. Lincoln Constance.

April 17, 1941. Third annual "Plants and Specimens" meeting, 2093 Life Sciences Building, University of California, Berkeley, at 7:45 P. M., in charge of Dr. G. Ledyard Stebbins, Jr., and Miss Beryl O. Schreiber. The President, Professor E. B. Babcock, occupied the chair. Short talks about the specimens or exhibits displayed were given as follows: A new tetraploid *Layia*, Dr. David D. Keck; Proteaceae, Miss Alice Eastwood; Vegetation type-mapping by aerial photography, Mr. A. E. Wieslander; The phylogeny of the closed-cone pines, Dr. H. L. Mason; The closed-cone pines of Ano Nuevo Point, Mr. Leo Koch; A new hexaploid *Solanum*, Dr. E. F. Paddock; Artificial production and selection of polyploid grasses for range re-population, Dr. Stebbins. A large number of attractive exhibits, ranging from algae, fungi and lichens to seeds, succulents and unusual cultivated plants were contributed by many exhibitors, including the following: Professor Babcock, Dr. and Mrs. Alan A. Beetle, Mr. and Mrs. Anson F. Blake, Dr. Marion S. Cave, Mr. Yale Dawson, Mr. George B. Furniss, Dr. John W. Gilmore, Dr. Frank Gould, Dr. A. W. Herre, Dr. Robert F. Hoover, Mr. Frank A. Leach, Mr. and Mrs. Forrest McAbee, Miss Elizabeth Morse, Miss Catherine Roberts, Mr. Jack Whitehead and Dr. Ira Wiggins.—L. Constance.